Research Problem Review 78-8

LEVEL II

EVALUATION OF THE BESELER CUE/SEE AS A SUBSTITUTE FOR THE L-W ANALYST PROJECTOR FOR MITAC II

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ARI FIELD UNIT AT FORT RUCKER, ALABAMA

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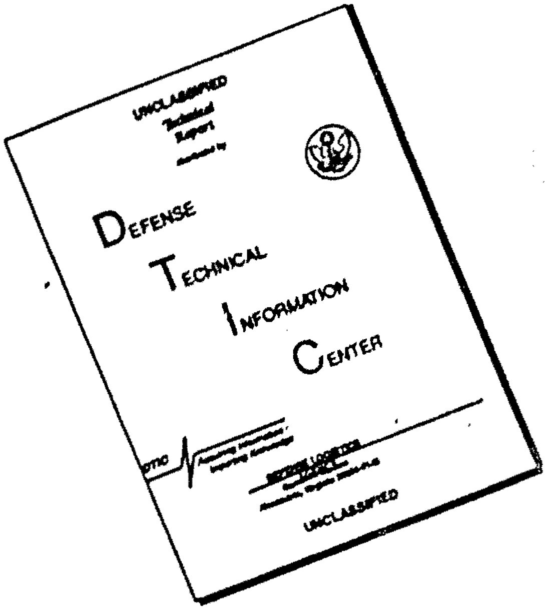

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Army Project Number
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Aircrew
Performance

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EVALUATION OF THE BESELER CUE/SEE AS A SUBSTITUTE FOR THE L-W ANALYST PROJECTOR FOR MITAC II

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FOREWORD

Nap-of-the-earth (NOE) flight training is receiving increasing attention from Army aviation as a way to meet the threat of sophisticated antiaircraft weapons. Of the specialized skills required for NOE flying, geographic orientation and navigation skills predominate. To meet these ~~unique~~ demands, the Army Research Institute (ARI) Field Unit at Fort Rucker, Ala., developed the Map interpretation and Terrain Analysis Course (MITAC). was developed.

This report assesses a training device for use in the MITAC curriculum. The study was undertaken by personnel of the ARI Field Unit, Fort Rucker, Ala., at the request of the Director of Training Developments, U.S. Army Aviation Center, (USAAVNC). Cooperation of USAAVNC military personnel is gratefully acknowledged.

The entire program of aviation training research and development is responsive to the requirements of Army Project 2Q263743A772, Aircrew Performance in the Tactical Environment, and the Directorate of Training Developments, USAAVNC, Fort Rucker, Ala.

JOSEPH ZEIDNER
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EVALUATION OF THE BESELER CUE/SEE AS A SUBSTITUTE FOR THE L-W ANALYST PROJECTOR FOR MITAC II

BRIEF

Requirement:

To evaluate an 8mm projector, the Beseler Cue/See, for use in the Map Interpretation and Terrain Analysis Course (MITAC).

Procedure:

Twenty-two student navigators traced filmed NOE flight routes on corresponding tactical maps. Half of the students viewed the films on the Beseler Cue/See and half viewed the films on the 16mm projector used for MITAC training. The dependent measure for both groups of students was total meters deviation of the routes they traced from the actual flight routes.

Findings:

No significant difference in performance was found between the two groups. It was concluded that the Beseler Cue/See would be as effective a training device as the 16mm projector and should be substituted for the projector in MITAC training. Use of the Beseler Cue/See would take advantage of its convenience and its availability in many installations where initiation of MITAC training is expected.

Utilization of Findings:

The MITAC II navigator training course has been reformatted to incorporate the Beseler Cue/See.

EVALUATION OF THE BESELER CUE/SEE AS A SUBSTITUTE FOR THE L-W ANALYST PROJECTOR FOR MITAC II

INTRODUCTION

In future combat environments, Army aviation anticipates encountering increasingly sophisticated air-defense tactics, including radar-directed and heat-seeking weapons. To prepare aircrews for this threat, Army aviation is emphasizing nap-of-the-earth (NOE) flight training. NOE flying requires that a helicopter fly as close as possible to the earth's surface, using whatever terrain or artificial features are available to afford concealment. By varying speeds and headings, and by taking advantage of vegetation, terrain contours, and structures to mask its presence, the aircraft attempts to avoid detection while carrying out a combat mission. However, NOE flying demands skills for which typical training in altitude flying is inadequate. The most prominent among these specialized skills are geographic orientation and navigation.[1]

Low-altitude flying and masking strategies result in a greatly restricted, rapidly changing field of view. Conventional tactical maps, the features of which are symbolized for high altitude viewing, do not take these fields into account. At very low altitudes, cartographic features such as roads, streams, and patterns of foliage tend to be obscured by the vegetation through which the aircraft is flying. Therefore, NOE navigation requires that physical properties of limited terrain features seen from low-flying helicopters be precisely correlated with symbols on topographic maps.

In order to assist the Aviation Center in developing a course that would meet the need for NOE navigation training, ARI developed the Map Interpretation and Terrain Analysis Course (MITAC).[2] This course was initially established in a classroom format, one essential ingredient of which was a skilled instructor or course manager. MITAC II was developed from the original MITAC course, but it involves navigator training in a self-paced format that does not require an instructor's presence at all times. An important part of both courses is teaching

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[1] Gainer, C. A. & Sullivan, D. J. Aircrew Training Requirements for Nap-of-the-Earth Flight. ARI Research Report 1190, August 1976.

[2] Holman, G. L. The Development of a Map Interpretation and Terrain Analysis Course to Support Nap-of-the-Earth Navigation. Proceedings of the Fifteenth Annual Army Operations Research Symposium, Vol. 2, 1976, 1126-1136.

students to relate features on topographical maps to terrain features typical of low level flight. This teaching is accomplished, in part, by presenting NOE flight routes on films. Students learn to trace these filmed flight routes on corresponding 1:50,000 scale tactical maps.

At the present time, terrain films used in both MITAC and MITAC II are projected on a large screen by the 16mm L-W Analyst projector. A possible alternative device, the Beseler Cue/See, is a compact 8mm device which incorporates its own small screen as part of the unit. It has been suggested that the Beseler Cue/See might be more suitable for the self-instructional, individually paced MITAC II course. Furthermore, because the Beseler is currently being used by the Army to present training materials of various types at many installations, adopting this device for MITAC II would not only standardize equipment, but would also greatly facilitate exporting MITAC II to areas where the Beseler is already available. In line with these considerations, ARI was requested by the Director of Training Developments, USAAVNC, to compare the Beseler Cue/See with the L-W Analyst projector to determine if the Beseler could meet the needs of MITAC II.

METHOD

Twenty-two Warrant Officer candidates who had completed MITAC were requested to participate in the study. Apparatus included the Beseler Cue/See and L-W Analyst projectors and map/film sets depicting NOE flights on Fort Rucker and Hunter-Ligget Military Reservations.

Table 1 depicts the independent, two-group design used to evaluate the Beseler device for MITAC II.

Table 1

Experimental Design

Group	Treatment	Performance measure
Experimental	Beseler Cue/See	Error scores
Control	L-W Analyst	Error scores

The task selected to test the Beseler equipment was one with which all subjects were familiar due to their MITAC training--tracing filmed NOE flight routes on tactical maps. The films and maps were similar to those used in navigator training but were unfamiliar to the subjects. Half the subjects viewed the films on the Beseler Cue/See, and the remaining half viewed them by means of the L-W projector. All subjects had used the L-W projector during navigation training, and all subjects had extensive experience with route tracing from films presented on L-W equipment. However, none of the subjects was familiar with the Beseler Cue/See. The study, therefore, was biased toward the L-W Analyst projector. This test was thus seen as exceptionally rigorous.

PROCEDURE

Subjects were randomly assigned to either a Beseler group or an L-W group and tested individually. Each subject was given a brief orientation describing the nature of the task, and was informed that the task consisted of tracing, on corresponding maps, the brief flight routes presented on two films. It was pointed out that each map included a 500-m wide corridor of operations and a 500-m long arrow indicating the beginning of the flight route. In addition, 14 checkpoints had been established and each subject was asked to indicate checkpoints along the routes when requested to do so during the films.

After the orientation, each subject was permitted to study the corridor of operations designated on the map plate for 10 minutes. This permitted identification of features within the corridor which could be expected to be visible in the filmed routes. After the inspection period, the first film was started and the tracing task began. When the first film ended, subjects were presented with the second map and given another 10-minute map inspection period, after which the second film was started. Following the second film, subjects were debriefed. They were informed that two types of projectors were being compared to determine if they were equally satisfactory for MITAC training. Also, subjects were shown the map plates on which flight routes were correctly traced.

RESULTS AND DISCUSSION

The dependent variable in this study was error magnitude, in meters, measured from each of 14 preselected checkpoints to corresponding checkpoints on the routes traced by the subjects. Table 2 displays these data. Error variations from one checkpoint to another reflect differences in ease of identification of the checkpoints. Whereas some errors occurred at clearly marked road intersections or at buildings symbolized on the maps, others occurred in densely wooded areas where the only cues were direction of flight and horizon features.

Table 2

Mean Errors in Meters per Checkpoint for Flight Route Tracing by Student Navigators

Checkpoint	Beseler group	L-W group
1	113.64	186.36
2	293.18	384.09
3	418.18	350.00
4	315.27	438.64
5	386.36	472.73
6	334.09	463.64
7	343.18	311.36
8	879.55	656.82
9	225.00	147.73
10	222.73	227.27
11	400.45	381.82
12	375.00	275.00
13	565.91	454.55
14	768.18	675.00
Mean total errors	402.91	387.50

The total mean error score of the Beseler group was slightly higher than that of the L-W group. However, 63% of the zero error scores occurred in the Beseler group. A score of zero recorded for any checkpoint indicated that the subject's tracing was precisely on route. That is, there was no deviation from the correct flight route for that checkpoint.

Average error magnitude in meters per subject was calculated using deviation scores for all checkpoints on both maps. This calculation yielded a single error score for each subject. A t test was used to analyze these data, and results showed that no significant difference occurred between performance by the Beseler group and the L-W group (t (20) = .16 p < .80).

The question this research addressed was whether the 8mm Beseler Cue/See should be substituted for the 16mm projector now being used to present terrain films to student navigators. It was assumed that if students with the same training backgrounds performed familiar classroom tasks as well or better when films were presented on the Beseler equipment, MITAC II could be modified to incorporate the Beseler Cue/See. This study demonstrates that performance differences between groups of students using the two types of projectors were insignificant.

CONCLUSIONS

The Beseler Cue/See is as effective a medium for navigator training as the L-W Analyst projector. It is therefore recommended that, given considerations of economy and facilitation in the operational use of MITAC II, the Beseler Cue/See should be adopted for MITAC II training.